

Draft Policy Option: A3 Agriculture, Ethanol Production

1. Policy Description:

a. Lay description of proposed policy action: Facilitate the production of ethanol as a motor fuel in Arizona.

b. Policy Design Parameters:

i. Implementation level(s) beyond business as usual (BAU):

Fuel cost savings to consumers: According to AAA, the average price per gallon of regular unleaded gasoline in Arizona for 2005 was \$2.354. Colleen Crowninshield, Clean Cities Manager, Pima Association of Governments reports that the average price of E85 was \$2.02 per gallon in 2005.

Fuel choice alternatives for consumers: Currently E85 is only sold in Tucson.

Improved air quality: Pursuant to ARS 41-803 the state is required to have at least 40% of its motor vehicle fleet capable of using alternative fuels. In the report by the Arizona Department of Administration titled “Use of Alternative Fuels in the State Motor Vehicle Fleet” to the Governor, President of the Senate, and Speaker of the House of Representatives in November 2005 the number of state light duty vehicles subject to this requirement is 5323. Of this number 2807 are capable of using alternative fuels. The five largest state fleets, excluding universities and community colleges, have 3879 vehicles of which 2400 (or 62%) are capable of burning alternative fuels. However, the state fuel cost for gas and diesel in FY 2005 was \$4,773,970 compared to \$325,588 (or 6% of the total fuel cost) for alternative fuels. If in fact the alternative fuel vehicles are using alternative fuels then it would seem that alternative fuels are very inexpensive (62% of the vehicles are using only 6% of the cost of fuel). However, a more likely explanation is that those alternative fuel vehicles capable of burning gasoline and diesel are doing just that, burning gasoline and diesel. In fact, of the 2807 vehicles in the state fleet capable of burning alternative fuels, 1148 (or 41%) are capable of using ethanol and therefore most likely are currently burning gasoline.

According to information from the Renewable Fuels Association (RFA), (<http://www.ethanolrfa.org/resource/facts/environment/>) the use of 10% ethanol blends reduces greenhouse gas emissions by 12-19% compared with conventional gasoline, according to Argonne National Laboratory. In 2004, ethanol use in the U.S. reduced CO₂-equivalent greenhouse gas emissions by approximately 7.03 million tons, equal to removing the annual emissions of more than one million cars from the road (Argonne's GREET 1.6 Model). RFA also reports that ethanol reduces smog pollution. Blending ethanol in gasoline dramatically reduces carbon monoxide tailpipe emissions. According to the National Research Council, carbon monoxide emissions are responsible for as much as 20% of smog formation. Additionally, ethanol-blended fuels reduce tailpipe emissions of volatile organic compounds, which readily form ozone in the atmosphere.

These reductions more than offset any slight increases of evaporative emissions due to the higher volatility of ethanol-blended fuel. Thus, the use of ethanol plays an important role in smog reduction. Importantly, in reformulated gasoline areas where smog is of most concern, gasoline blended with ethanol must meet the same evaporative emission standard as gasoline without ethanol. These ethanol blends have the added benefit of providing reduced tailpipe carbon monoxide emissions and, therefore, further emissions reductions of smog.

Rural economic development: Currently an ethanol production facility is being built in Maricopa, Arizona. The facility broke ground on January 30, 2006 and will begin production in the spring of 2007. The plant is expected to employ approximately 45 to 50 individuals. The positions will include management, laboratory, and mill employees with a payroll of over 1 million dollars per year. The plant anticipates revenues of between 110 and 120 million dollars per year. In addition, because this plant will use corn as a feedstock for ethanol production, Arizona farmers will have an alternative crop opportunity to an extent currently unavailable. The plant anticipates using 18 million bushels of corn each year. Presently Arizona farmers produce only 5 million bushels of corn each year.

ii. Timing of implementation: The groundbreaking for the ethanol production facility in Maricopa occurred on January 30, 2006. The facility will begin production in the spring of 2007. The state fleet currently has 1148 vehicles capable of using ethanol that are most likely burning gasoline. State Representative Tom Boone introduced legislation in January 2006 that will facilitate the sale of ethanol to retail consumers in Maricopa County. Currently ethanol is only available to the public in one or two stations in Tucson. He is also expected to introduce legislation that will that will facilitate the production of ethanol and biodiesel.

iii. Implementing parties: State officials will be involved in the passage of legislation designed to facilitate the production of ethanol and biodiesel.

c. Implementation Mechanism(s): The following activities should occur:

i. Information and education: The Legislature, the Governor's administration, city and county officials, and the public will need to be informed and educated regarding the benefits of and hurdles to ethanol production in the state. Consumers need to be made aware of the fact that many of their current vehicles may be capable of burning ethanol based fuels and that many of the newly-manufactured vehicles will also have that flexibility.

ii. Technical assistance: Technical assistance can be obtained from national organizations such as the Renewable Fuels Association. In addition, federal EPA and state DEQ can be of assistance. Also, various regions of the state have clean city coalitions such as the Valley of the Sun Clean Cities Coalition and the Pima County Clean Cities Coalition.

iii. Funding mechanisms and or incentives: Rep. Boone introduced HB 1455 in the 2005 legislative year. The bill contained a reduction in the fuel tax for those purchasing fuels covered by the bill and a reduction in the property tax rate for production facilities covered by the bill. In addition, there are federal incentives for production and for the installation of retail refueling stations.

iv. Statutes and Rules:

1. As noted above, Rep. Boone has introduced legislation that will accomplish the following:

a. Facilitate the sale of ethanol to retail consumers in Maricopa County. Currently ethanol is only available to the public in one or two stations in Tucson.

b. Facilitate the production of ethanol and biodiesel by (1) removing the fuel tax for the purchase of ethanol and biodiesel and, (2) lowering the property tax for ethanol and biodiesel production facilities from 25% to 10%.

2. Additional concepts for legislation include:

a. Amending ARS 28-2416 to allow the owners of vehicles capable of using ethanol to purchase special high occupancy lane license plates if they qualify under the law.

b. Creating a state credit similar to that available at the federal level for federal vehicle fleets. Like the federal credit, the state credit would be based on the purchase of ethanol or biodiesel by the fleet manager. The concept of the mandates found in ARS 41-803 was to actually use ethanol or biodiesel not merely stock the fleet with vehicles that are capable of doing so. The credit would allow a one vehicle credit toward the state mandate in return for the purchase of a certain volume of ethanol or biodiesel. For example, currently at the federal level a purchase of 450 gallons of biodiesel (B100) equals one vehicle. Using the same concept for E85 would equate to 530 gallons of ethanol (450 divided by 85%). The purchase of 530 gallons of E85 by a state fleet manager would equal one vehicle.

vi. Market based mechanisms: Given the commitment by major automobile manufacturers to producing vehicles that will utilize ethanol and the current number of these vehicles in the state fleet, it is anticipated that once state ethanol production is online market based mechanisms can be successful. These will depend upon the incentives provided to potential consumers, refueling facilities, and production facilities currently in place and those introduced by Rep. Boone.

vii. Pilots and demonstrations: Programs that can be viewed as pilot programs currently exist in the form of retail refueling locations in Tucson, the ethanol facility

being built in Maricopa, and the large number of ethanol capable vehicles in the state fleet. Better utilization and education about these programs will be important.

2. BAU Policies/Programs, if applicable:

a. Description of policy/program #1: The retail purchase of ethanol in Arizona is currently limited to Tucson. See above for steps being taken to modify this situation.

b. Description of policy/program #2: Currently ARS 41-803 has the following requirements:

i. As of December 31, 1995, the state was mandated to have 40% of the total state fleet capable of using alternative fuels. Community colleges were not include but rather had to meet the 40% requirement by December 31, 2002. In the report by the Arizona Department of Administration titled “Use of Alternative Fuels in the State Motor Vehicle Fleet” to the Governor, President of the Senate, and Speaker of the House of Representatives in November 2005 the number of state light duty vehicles subject to this requirement is 5323. Of this number 2807 (or 53%) are capable of using alternative fuels.

ii. As of December 31, 1997, Maricopa County was mandated to have 90% of its qualifying fleet capable of using alternative fuels.. Maricopa County community colleges were to be in compliance by December 31, 2004. According to the ADOA report noted above, Maricopa County currently has 2752 vehicles subject to this requirement of which 2001 (or 73%) are alternative fuel capable.

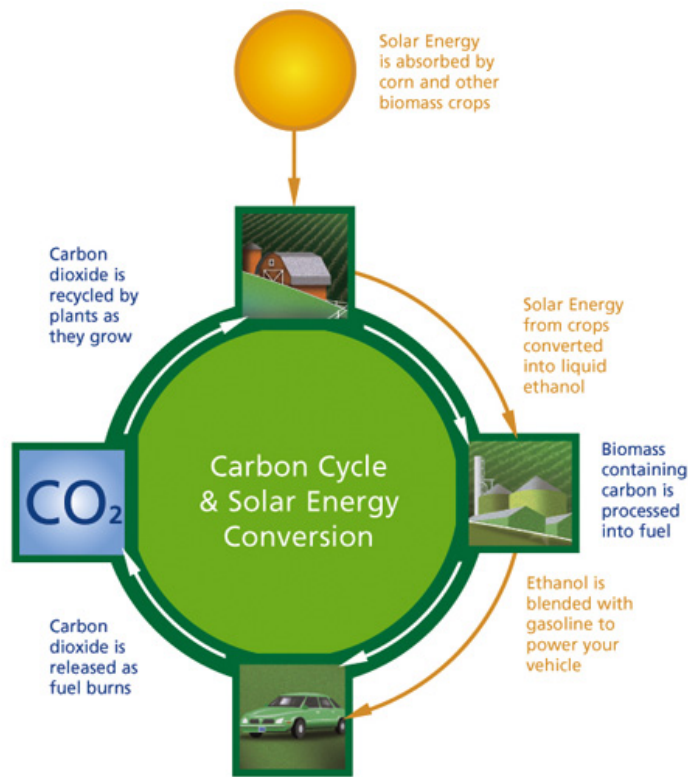
iii. The state is also mandated to achieve at least 75% of new vehicle purchases that operate primarily in Pima and Maricopa County to be capable of using alternative fuels. According to the ADOA report the state has met this requirement.

However, as noted above, the five largest state fleets, excluding universities and community colleges, have 3879 vehicles of which 2400 (or 62%) are capable of burning alternative fuels. The state fuel costs of these five fleets for gas and diesel in FY 2005 was \$4,773,970 compared to \$325,588 (or 6% of the total fuel costs) for alternative fuels. If in fact the alternative fuel vehicles are using alternative fuels then it would seem that alternative fuels are very inexpensive (62% of the vehicles are using only 6% of the cost of fuel). However, a more likely explanation is that those alternative fuel vehicles capable of burning gasoline and diesel are doing just that, burning gasoline and diesel. In fact, of the 2807 vehicles in the state fleet capable of burning alternative fuels, 1148 (or 41%) are capable of using ethanol and therefore most likely are currently burning gasoline.

As a result, both the spirit and the intent of ARS 41-803 are not being met. A request has been made to the Arizona Department of Administration for the amount of ethanol actually purchased by the state in FY 2005.

3. Types(s) of GHG and other Environmental Benefit(s):

CO₂: The ethanol production process represents a carbon cycle, where plants absorb carbon dioxide during growth, “recycling” the carbon released during fuel consumption. According to information from the Renewable Fuels Association (RFA), (<http://www.ethanolrfa.org/resource/facts/environment/>) the use of 10% ethanol blends reduces greenhouse gas emissions by 12-19% compared with conventional gasoline, according to Argonne National Laboratory. In 2004, ethanol use in the U.S. reduced CO₂-equivalent greenhouse gas emissions by approximately 7.03 million tons, equal to removing the annual emissions of more than one million cars from the road (Argonne's GREET 1.6 Model).



Source: Renewable Fuels Association

4. Types of Ancillary Benefits and or Costs, if applicable:

a. The American Lung Association of Metropolitan Chicago credits ethanol-blended reformulated gasoline with reducing smog-forming emissions by 25% since 1990.

b. Ethanol reduces tailpipe carbon monoxide emissions by as much as 30%, toxics content by 13% (mass) and 21% (potency), and tailpipe fine particulate matter (PM) emissions by 50%. Ethanol also reduces secondary PM formation by diluting aromatic content in gasoline. Over half of the air pollution attributable to vehicles comes from "high emitting" vehicles that make up only 10% of the vehicle fleet. High emitters

include older vehicles as well as newer cars with malfunctioning pollution control systems. The use of ethanol-blended fuel is also one of the best pollution control strategies for off-road vehicles, including motorcycles, ATVs and snowmobiles, which represent a significant source of emissions. Source: Smog Reyes, February 2004

c. Ethanol is the oxygenate of choice in the federal winter oxygenated fuels program and the reformulated gasoline (RFG) program in cities that exceed public health standards for carbon monoxide and ozone pollution.

d. Ethanol is rapidly biodegraded in surface water, groundwater and soil, and is the safest component in gasoline today.

A recent study conducted for the Governors' Ethanol Coalition, "The Fate and Transport of Ethanol-Blended Gasoline in the Environment," concluded that ethanol poses no threat to surface water and ground water. According to the report, ethanol is a naturally occurring substance produced during the fermentation of organic matter and is expected to rapidly biodegrade in essentially all environments. When gasoline contaminates soil or water, ethanol is the first component to quickly, safely, and naturally biodegrade. A study commissioned by the MTBE industry suggested that in the event of a gasoline spill or leak, since ethanol breaks down first, benzene would persist in the environment longer. But this ignores the fact that ethanol-blended fuels contain less benzene, and the real threat posed to the environment is from the presence of benzene in gasoline, not ethanol.

e. Ethanol reduces smog pollution.

Blending ethanol in gasoline dramatically reduces carbon monoxide tailpipe emissions. According to the National Research Council, carbon monoxide emissions are responsible for as much as 20% of smog formation. Additionally, ethanol-blended fuels reduce tailpipe emissions of volatile organic compounds, which readily form ozone in the atmosphere. These reductions more than offset any slight increases of evaporative emissions due to the higher volatility of ethanol-blended fuel. Thus, the use of ethanol plays an important role in smog reduction.

Importantly, in reformulated gasoline areas where smog is of most concern, gasoline blended with ethanol must meet the same evaporative emission standard as gasoline without ethanol. These ethanol blends have the added benefit of providing reduced tailpipe carbon monoxide emissions and, therefore, further emissions reductions of smog.

f. Ethanol has a positive energy balance.

Whether produced from corn or other biomass feedstocks, ethanol generates more energy than used during production. Plants used in ethanol production harness the power of the sun to grow. By releasing the energy stored in corn and other feedstocks, ethanol production utilizes solar energy, replacing fossil energy use. A life cycle analysis of ethanol production - from the field to the vehicle - found that ethanol has a large and growing positive fossil energy balance. According to a 2004 U.S. Department of

Agriculture Study, ethanol yields 67% more fossil energy than is used to grow and harvest the grain and process it into ethanol. The study makes note of significant energy efficiency improvements that have been made in ethanol production due to higher yielding corn varieties, technological advances in ethanol production such as the use of molecular sieves and natural gas, and improved farming practices (precision and no-till farming.) Unlike ethanol, other fuels, take more fossil energy to produce than they yield. Importantly, producing ethanol from domestic grains achieves a net gain in a more desirable form of energy. It utilizes abundant domestic energy sources, such as natural gas and coal, to convert grain into a premium liquid fuel. Only about 17% of the energy used to produce ethanol comes from liquid fuels, such as gasoline and diesel fuel.

Please see the article by Dr. Michael S. Graboski, Colorado School of Mines and Dr. John McClelland, National Corn Growers Association published to refute a recent article by Dr. David Pimentel titled, “Ethanol Fuels: Energy, Economics and Environmental Impact”. Dr. Pimentel reported that it takes 1.7 times the energy to produce a gallon of ethanol compared to its energy content. He thus concludes that ethanol produced from corn is not renewable.

Graboski and McClelland conclude that “by using old data and questionable assumptions, Pimentel draws the wrong conclusion about corn agriculture, and the use of ethanol as it relates to sustainability and domestic energy policy. Even if ethanol energetics were not favorable, there is an argument to be made in favor of ethanol. We estimate that on an energy basis, only 0.13 BTU of petroleum are used to produce a BTU of ethanol. Since the root of our short -term energy problem is related to liquid fuels, ethanol should be viewed as an extremely effective way to convert natural gas and coal into liquid fuel energy. Since corn-based ethanol has a positive energy balance, it necessarily has a positive impact on climate change.”

See <http://www.ethanolrfa.org/objects/documents/84/ethanolffuelsrebuttal.pdf> for the full report.